APPENDIX

G Slurry Displacement Piles

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Figure G-1. FTB CIDH Pile Acceptance Test Request Form

<table>
<thead>
<tr>
<th>Support Location (Abut/Beat #)</th>
<th>Pile Numbers</th>
<th>Pile Diameter</th>
<th>Pile Length</th>
<th>Date Ready for Testing</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Please submit test request to FTB by 11:00AM each Friday for testing to be scheduled for the following week.
2. Please update all Estimated Dates as dates can be confirmed or as piles become ready for testing.
3. Inspection tubes must be verified as capable of passing the specified dummy probe freely prior to a pile being ready for testing.

For FTB Office Use Only

<table>
<thead>
<tr>
<th>FTB Tracking</th>
<th>FTB Rep</th>
<th>Date Tested</th>
<th>Date of Report</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Comments: 

For individuals with sensory disabilities, this document can be made available in Braille, large print, audiostreamer or computer disk upon request. To obtain one of these alternate formats, please call (916) 227-8185 or 777 711 or write to the EEO Officer, Division of Engineering Services, P.O. Box 168031, Mail Stop 9 Room 509, Sacramento, CA 95816-6041.
Memorandum

To: ALLEN KING  
Structure Representative  
SR 4 Crosstown Viaduct

Date: April 27, 2015

File: 10-SJ-4-T14.83  
10-0S1104 (1000000229)  
SR4 Crosstown Viaduct  
Bridge No. 29-0350

From: DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES - MS 5

Subject: Gamma-Gamma Logging Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct

Introduction

This memorandum presents Gamma-Gamma Logging (GGL) test results for Pile 1 (referred to as Pile 7-1) at Bent 7 of the SR4 Crosstown Viaduct. The subject pile is a Cast-In-Drilled-Hole (CIDH) concrete pile with a diameter of 108 inches. The pile contains ten (10) inspection pipes on the interior of the reinforcing steel cage. The centerline location of the pile with number designation was provided by Structure Construction and is shown on the Foundation Plan No. 2 sheet included in Appendix A. The reported elevations for top of concrete, bottom of inspection pipe, and pile tip were provided by OSC and are included in Appendix B. Pile information is summarized in Table I.

Table I: Summary of Pile Information: Pile 7-1 at Bent 7

<table>
<thead>
<tr>
<th></th>
<th>Pile 7-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specified Pile Cut-Off Elev. (ft)</td>
<td>0.00</td>
</tr>
<tr>
<td>Construction Joint Elev. (ft)</td>
<td>-15.00</td>
</tr>
<tr>
<td>Specified Pile Tip Elev. (ft)</td>
<td>-150.00</td>
</tr>
<tr>
<td>Reported Bottom of Permanent Steel Casing Elev. (ft)</td>
<td>-20.00</td>
</tr>
<tr>
<td>Reported Top of Concrete Elev. (ft)</td>
<td>-15.00</td>
</tr>
<tr>
<td>Reported Bottom of Inspection Pipe Elev. (ft)</td>
<td>-147.80</td>
</tr>
<tr>
<td>Reported CIDH Pile Tip Elev. (ft)</td>
<td>-151.50</td>
</tr>
<tr>
<td>Approx. CIDH Pile Length (ft)</td>
<td>136.50</td>
</tr>
<tr>
<td>Approx. GGL-Tested Length (ft)</td>
<td>132.11</td>
</tr>
<tr>
<td>Approx. Length of Untested Concrete at Bottom of Pile (ft)</td>
<td>4.39</td>
</tr>
</tbody>
</table>

(1) Based on information provided in the Contract Plans.  
(2) Based on information provided in the Contractor’s Drilled Shaft Record II.  
(3) Calculated from information provided.  
(4) GGL data not collected over the bottom 1 foot of inspection pipe – See Background of this report.
GGL at Pile 7-1 was conducted by Technician Rocco Cosato of the Foundation Testing Branch (FTB) on April 23, 2015 within each accessible inspection pipe. Testing utilized a Mt. Sopris Model HLP-2375 Gamma-Gamma Probe with a 100-millicurie Cesium 137 source. The inspection pipes for the subject pile are numbered in a clockwise direction with Pipe 1 marked with orange paint in the field.

**Background**

GGL is generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. Substantial drops in bulk density readings from GGL are indicative of the presence of anomalies in the material surrounding the inspection pipe. For the Mt. Sopris Model HLP-2375 Gamma-Gamma Probe used by this Office, the range of detection is approximately 3 inches into the concrete surrounding the inspection pipe.

Limitations of the GGL equipment preclude the accurate measurement of concrete density across the top one foot of the pile. Data collected in the top one foot of pile concrete is influenced by the detector exiting the concrete, and calibration of measured gamma count rate to density is not applicable in this region. The trend of measured densities immediately below the top one foot of pile concrete may assist the Engineer in evaluation of the top of pile concrete. Limitations of the GGL equipment also prevent evaluation of the concrete surrounding the bottom approximate one foot of an inspection pipe. The total length of untested concrete at the bottom of a given pile is equal to the length of pile below the bottom of the inspection pipe plus one foot.

**Discussion**

A GGL graph depicting the variation from mean bulk density versus depth for Pile 7-1 at Bent 7 is presented in Appendix C. The mean and standard deviation criteria set was derived from GGL readings of the tested lengths of the inspection pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable. The reported locations of inspection pipe couplers were considered in the analysis. For each inspection pipe, separate mean densities were calculated for the known differences in the steel reinforcement schedule. Testing was performed in the completely submerged condition using a submerged probe calibration. GGL results are presented in Table II.
Table II: Summary of GGL Test Results: Pile 7-1 at Bent 7

<table>
<thead>
<tr>
<th>Pile (Section)</th>
<th>Approx. Depth(1) (ft)</th>
<th>Approx. Elevation(2) (ft)</th>
<th>GGL Pipe(s)</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (A-A)</td>
<td>51.4' to 52.3'</td>
<td>-66.4' to -67.3'</td>
<td>6</td>
<td>GGL detected an anomaly at one inspection pipe. Depth of anomaly is near the reported location of a PVC coupler. However, the anomalies magnitude of deviation from mean density is not consistent with a PVC coupler. May affect up to 10% of the pile cross-section at this depth range.</td>
</tr>
</tbody>
</table>

(1) Depth 0.0 feet is equal to the Reported Top of Concrete / Construction Joint Elevation of -15.0'.
(2) Calculated based on elevation information provided by OSC.

Recommendations

This Office recommends rejection of Pile 7-1 at Bent 7 based on the GGL test results. Please see the Pile Design Data Form (PDDF) in Appendix D and refer to Caltrans BRIDGE CONSTRUCTION MEMO 130-10.0 (June 30, 2014) for guidance in addressing rejected CIDH piles. This Office will conduct Cross-Hole Sonic Logging at Pile 7-1 to further evaluate the size of reported anomalies if requested by the OSC.

This Office also recommends that OSC inspect the top of pile concrete prior to completing pile construction above the reported construction joint elevation. Further, this Office recommends that pile designer’s review the condition of over 4 feet of untested concrete at the bottom of the pile.

This Office also recommends OSC review the Contractor’s plan for placing inspection pipes considering the bottom of inspection pipe elevation, as reported, indicates inspection pipes do not extend to the bottom of the reinforcing steel cage as required by the specifications.

“Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and vitality”
If you have any questions or comments regarding this report, please contact Jason Wahleithner at (916) 227-1059.

JASON D. WAHLEITHNER, P.E.
Transportation Engineer, Civil
Foundation Testing Branch
Office of Geotechnical Support

BEN BARNES, P.E.
Senior Transportation Engineer (Acting)
Foundation Testing Branch
Office of Geotechnical Support

C: J. Abercrombie – OSC (Email)
   N. Terzis – OSC (Email)
   Q. Huang – OGDN (Email)
   K. Harirsaz – R&M Engineers (Email)
   C. Puzzi – OSC (Email)

   B. Alsamman – OSC (Email)
   R. Erfanian – OSFP (Email)
   M. Mihkovic – METS (Email)
   C. Henderson–Kleinfelder (Email)
   GEODOG

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability."
APPENDIX A

Pile Location

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7
APPENDIX B

Pile Information

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7
### Drilled Shaft Record II

**INSTRUCTION TUBE LOG**

**PROJECT/CONTRACT:**
SR4 Crosstown Viaduct

**SHAFT NUMBER:**
Bent 7-1

**RECORDS DATE:**
24-Mar-15

<table>
<thead>
<tr>
<th>DEPTH FROM TOP (FT)</th>
<th>INSPECTION TUBE NUMBER</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>X X X X X X X X X X X</td>
<td>PVC Coupler</td>
</tr>
<tr>
<td>8.63</td>
<td>X X X X X X X X X X X</td>
<td>PVC Coupler</td>
</tr>
<tr>
<td>28.63</td>
<td>X X X X X X X X X X X</td>
<td>PVC Coupler</td>
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<tr>
<td>128.53</td>
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<td>148.53</td>
<td>X X X X X X X X X X X</td>
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<tr>
<td>149.53</td>
<td>X X X X X X X X X X X</td>
<td>PVC Coupler</td>
</tr>
</tbody>
</table>

**COMMENT:**

**SHAFT TIP ELEVATION:** -151.5 FT  
**TOP OF INSPECTION TUBE ELEVATION:**  FT  
**TOP OF CONCRETE ELEVATION:** -16 FT  
**TOP OF INSPECTION TUBE ELEVATION:** -147.5 FT

**SUPERVISOR NAME:** Jerry Flores  
**DATE:** 4/7/15  
**INSPECTOR NAME:**  
**DATE:**

**CALTRANS • FOUNDATION MANUAL**  
G - 10
APPENDIX C

Gamma-Gamma Logging Acceptance Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7
GAMMA-GAMMA LOGGING ACCEPTANCE TEST RESULTS
SR4 Crosstown Viaduct
Pile 7-1 at Bent 7

108" Diameter CIDH Pile
Reported Cut-off Elev. = -15.00 ft
Reported Pile Tip Elev. = -151.5 ft
Winch/Probe/Source: 1328-3581-429

The mean and standard deviation were calculated using density readings from all pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable.
APPENDIX D

Pile Design Data Form (PDDF)

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 7-1 at Bent 7
**Appendix D - Pile Design Data Form (GGL)**

**1 Foundation Testing**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Jason Wahleithner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone:</td>
<td>(916) 227-1059</td>
</tr>
<tr>
<td>Date:</td>
<td>4/27/2015</td>
</tr>
</tbody>
</table>

**Anomaly Overview**

- **Shaft Diameter:** 108" CIDH
- **Cutoff Elev. Or Top of Concrete Elev:** -15.00’
- **Permanent Steel Casing:**
  - 10
  - 2
  - 3
  - 4
  - 5
  - 6
- **Section A - A**
  - Elev: 66.4’ to 67.3’
  - Depth: 51.4’ to 52.3’
- **Section B - B**
  - Elev: Depth: 

**NOT TO SCALE**

- **Reported Tip Elev.:** -151.50’
- **Anomaly Description**
  - Section A - A: GGL detected an anomaly at one (1) inspection pipe (IP 6). May affect up to 10% of pile cross-section at this depth range.
  - Section B - B:

**2 Geotechnical**

- **Required Nominal Resistance of Pile (per contract plans):**
  - Compression: __________ kip
  - Tension: __________ kips
- **Groundwater Elevation:**
- **"As-Designed" nominal resistance over entire pile surface from the top to bottom elev. of anomaly / capacity loss within anomaly length (kips):**
  - Section A-A: Compression __________ kip, Tension __________ kips
- **Soil and/or Rock Type:**
- **Section is geotechnically:**
  - □ Acceptable □ Unacceptable
  - Section B-B: Compression __________ kip, Tension __________ kips
  - □ Acceptable □ Unacceptable
- **Soil and/or Rock Type:**
- **Comments:**

**3 Structural**

- **As-Designed Capacity of Shaft**
  - Section A-A: Shear: __________ Moment: __________
  - Section B-B: Shear: __________ Moment: __________

- **Maximum Demand of Shaft at Section A-A:**
  - Shear: __________ Moment: __________
  - Shaft is structurally:**
  - □ Acceptable □ Unacceptable

- **Maximum Demand of Shaft at Section B-B:**
  - Shear: __________ Moment: __________
  - Shaft is structurally:**
  - □ Acceptable □ Unacceptable

<table>
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<tr>
<th>Comment</th>
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</thead>
</table>

**4 Corrosion**

<table>
<thead>
<tr>
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</thead>
</table>

- **Consideration is:** □ Required □ Not Required

**For anomalies between the top of pile and 3 ft below the lowest estimated groundwater level at the site, corrosion results listed in the Geotechnical report are used to assess the need for repair. For situations where results are not available, soil samples may be obtained adjacent to the anomaly and tested in accordance with California Test (CT) 643 (Parts 2, 3 and 4) and if necessary, CT 417 and CT 452 to determine soil corrosivity. For anomalies outside these limits, and where no stray current source can be identified, or for non-corrosive soil conditions, no consideration of corrosion potential is required.**

**Corrosion Potential at Section A-A:**

**Corrosion Potential at Section B-B:**

**5 Construction**

<table>
<thead>
<tr>
<th>Sec. A-A:</th>
<th>□ Acceptable with Administrative Deduction</th>
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</thead>
<tbody>
<tr>
<td>Sec. B-B:</td>
<td>□ Acceptable with Administrative Deduction</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Bridge:</th>
<th>SR4 Crosstown Viaduct</th>
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</thead>
<tbody>
<tr>
<td>Dist-Co.-Rte:</td>
<td>10-SJ-4-T14.03</td>
</tr>
<tr>
<td>Structure Rep.:</td>
<td>Allen King</td>
</tr>
<tr>
<td>Phone:</td>
<td>(209) 470-8619</td>
</tr>
<tr>
<td>Fax:</td>
<td>n/a</td>
</tr>
<tr>
<td>Bridge No.:</td>
<td>29-0350</td>
</tr>
<tr>
<td>EA:</td>
<td>10-051104</td>
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<tr>
<td>Bent:</td>
<td>7</td>
</tr>
<tr>
<td>Pile:</td>
<td>7-1</td>
</tr>
</tbody>
</table>
To: ALLEN KING  
Structure Representative  
SR 4 Crosstown Viaduct  

Date: April 30, 2015  

File: 10-SJ-4-T14.83  
10-051104 (1000002229)  
SR4 Crosstown Viaduct  
Bridge No. 29-0350  

From: DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES - MS 5  

Subject: Combined Gamma-Gamma Logging (GGL) and Cross-Hole Sonic Logging (CSL) Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct  

Introduction  

This memorandum presents the combined GGL and CSL test results for Pile 1 (referred to as Pile 7-1) at Bent 7 of the SR4 Crosstown Viaduct. The subject pile is a Cast-In-Drilled-Hole (CIDH) concrete pile with a diameter of 108 inches. The pile contains ten (10) inspection pipes on the interior of the reinforcing steel cage. The centerline location of the pile with number designation was provided by Structure Construction and is shown on the Foundation Plan No. 2 sheet included in Appendix A. The reported elevations for top of concrete, bottom of inspection pipe, and pile tip were provided by OSC and are included in Appendix B. Pile information is summarized in Table I.  

Table I. Summary of Pile Information: Pile 7-1 at Bent 7  

<table>
<thead>
<tr>
<th>Pile 7-1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specified Pile Cut-Off Elev. (ft) (1)</td>
<td>0.00</td>
</tr>
<tr>
<td>Construction Joint Elev. (ft) (2)</td>
<td>-15.00</td>
</tr>
<tr>
<td>Specified Pile Tip Elev. (ft) (3)</td>
<td>-150.00</td>
</tr>
<tr>
<td>Reported Bottom of Permanent Steel Casing Elev. (ft) (3)</td>
<td>-20.00</td>
</tr>
<tr>
<td>Reported Top of Concrete Elev. (ft) (2)</td>
<td>-15.00</td>
</tr>
<tr>
<td>Reported Bottom of Inspection Pipe Elev. (ft) (2)</td>
<td>-147.80</td>
</tr>
<tr>
<td>Reported CIDH Pile Tip Elev. (ft) (2)</td>
<td>-151.50</td>
</tr>
<tr>
<td>Approx. CIDH Pile Length (ft) (3)</td>
<td>136.50</td>
</tr>
<tr>
<td>Approx. GGL Tested Length (ft) (10)/CSL Tested Length (ft)</td>
<td>132.11 / 133.0</td>
</tr>
<tr>
<td>Approx. Length of Untested Concrete at Bottom of Pile (ft) (4)</td>
<td>4.59</td>
</tr>
</tbody>
</table>

(1) Based on information provided in the Contract Plans.  
(2) Based on information provided in the Contractor's Drilled Shaft Record II.  
(3) Calculated from information provided.  
(4) GGL data not collected over the bottom 1 foot of inspection pipe – See Background of this report.  

“Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability.”
Based on GGL test results as presented in “Gamma-Gamma Logging Test Results: Pile 1 at Bent 7 of the SR4 Crosstown Viaduct” dated April 27, 2015, CSL testing was conducted at Pile 1 to further define the estimated size of a reported anomaly. Engineers Jeremy Peterson-Self and Jason Wahleithner of the Foundation Testing Branch (FTB) performed the CSL testing on April 28, 2015. CSL Testing utilized the Cross-Hole Analyzer (Pile Dynamics, Inc.) Model: CHAMP in order to further evaluate the pile concrete. The inspection pipes for the subject pile are numbered with Pipe 1 marked with orange paint in the field.

Background

GGL and CSL are generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. As each test examines different parts of the shaft cross-section, they can be used in combination to complement one another.

GGL is generally viewed as among the most accurate non-destructive test methods used to detect anomalies in CIDH piles. Substantial drops in bulk density readings from GGL are indicative of the presence of anomalies in the material surrounding the inspection pipe. For the Mt. Sopris Model HL.P-2375 Gamma-Gamma Probe used by this Office, the range of detection is approximately 3 inches into the concrete surrounding the inspection pipe.

Limitations of the GGL equipment preclude the accurate measurement of concrete density across the top one foot of the pile. Data collected in the top one foot of pile concrete is influenced by the detector exiting the concrete, and calibration of measured gamma count rate to density is not applicable in this region. The trend of measured densities immediately below the top one foot of pile concrete may assist the Engineer in evaluation of the top of pile concrete. Limitations of the GGL equipment also prevent evaluation of the concrete surrounding the bottom approximate one foot of the inspection pipe. The total length of untested concrete at the bottom of a given pile is equal to the length of pile below the bottom of the inspection pipe plus one foot.

For CSL, high frequency compression waves propagating through the concrete material between the signal probe and receiver probe placed in pipe pairs is examined to evaluate concrete integrity between pipes. The propagation time of these sonic waves is a function of concrete density and wave travel path. A significant increase in wave arrival time, or reduction in apparent sonic wave velocity, is representative of the presence of anomalies in the material between the inspection pipes.

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CSL is utilized as an indicator of concrete integrity between the signal probe and receiver probe pair. CSL cannot confirm concrete integrity around the inspection pipe perimeter, as verified by GGL, and this uncertainty is one limitation of CSL testing when attempting to verify concrete homogeneity around the perimeter of an inspection pipe.

**Discussion**

The previously reported GGL graph depicting the variation from mean bulk density versus depth for Pile 7-1 at Bent 7 is presented in Appendix C. The mean and standard deviation criteria set was derived from GGL readings of the tested lengths of the inspection pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable. The reported locations of inspection pipe couplers were considered in the analysis. For each inspection pipe, separate mean densities were calculated for the known differences in the steel reinforcement schedule. Testing was performed in the completely submerged condition using a submerged probe calibration.

Plots presenting the CSL compression wave arrival times and signal energy as a function of depth for the subject piles are presented in Appendix D. The general criteria for analyzing CSL results are also included in Appendix E. A summary of the combined GGL and CSL analyses are presented in Table II and shown in a section view included in Appendix D.

**Table II: Summary of GGL Test Results: Pile 7-1 at Bent 7**

<table>
<thead>
<tr>
<th>Pile (Section)</th>
<th>Approx. Depth(1) (ft)</th>
<th>Approx. Elevation(2) (ft)</th>
<th>GGL Pipe(s)</th>
<th>CSL Pipe Pair(s)</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (A-A)</td>
<td>51.4' to 52.3'</td>
<td>-66.4' to -67.3'</td>
<td>6</td>
<td>--</td>
<td>GGL detected an anomaly at one inspection pipe. Depth of anomaly is near the reported location of a PVC coupler. However, the anomaly’s magnitude of deviation from mean density is not consistent with a PVC coupler. No anomalies detected by CSL at the same depth range (Pipe Pair Combinations 5-6, 6-7, and 5-7). May affect up to 2% of the pile cross-section at this depth range.</td>
</tr>
</tbody>
</table>

(1) Depth 0.0 feet is equal to the Reported Top of Concrete / Construction Joint Elevation of -15.0'.  
(2) Calculated based on elevation information provided by OSC.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"
CSL was conducted for three profiles (Inspection Pipes 5-6, 6-7, 5-7) representing an inside boundary of the anomaly reported in the GGL report. The anomaly was not found in any of the three profiles indicating the actual location is likely contained to the pile perimeter adjacent to Inspection Pipe 6.

Recommendations

This Office recommends continued rejection of Pile 7-1 at Bent 7 based on the combined GGL and CSL test results. Please see the revised Pile Design Data Form (PDDF) in Appendix F and refer to Caltrans BRIDGE CONSTRUCTION MEMO 130-10.0 (June 30, 2014) for guidance in addressing rejected CIDH piles.

This Office also continues to recommend that OSC inspect the top of pile concrete prior to completing pile construction above the reported construction joint elevation. Further, this Office continues to recommend that pile designer’s review the condition of over 4 feet of untested concrete at the bottom of the pile.

This Office also recommends OSC review the Contractor’s plan for placing inspection pipes considering the bottom of inspection pipe elevation, as reported, indicates inspection pipes do not extend to the bottom of the reinforcing steel cage as required by the specifications.

If you have any questions or comments regarding this report, please contact Jason Wahleithner at (916) 227-1059.
APPENDIX A

Pile Location

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
APPENDIX B

Pile Information

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
## Appendix G—Slurry Displacement Piles

### October 2015

**Malcolm Drilling Co., Inc.**

**Drilled Shaft Record II**

**Inspection Tube Log**

**Bent No.:** Bent 7-1

**Recording Date:** 24-Mar-15

### Project/Contract

| SR4 Crosstown Viaduct |

<table>
<thead>
<tr>
<th>Shaft Diameter</th>
<th>Shaft Type</th>
<th>CIDH</th>
<th>Ground Elevation</th>
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<tbody>
<tr>
<td>9.0 ft</td>
<td>C15H</td>
<td></td>
<td>11.8 ft MSL</td>
</tr>
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</table>

### Inspection Tube Number

<table>
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<tr>
<th>Depth from Top of Rim (ft)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<td>-1.4</td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-6.6</td>
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<td>X</td>
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<td>X</td>
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<td></td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>-146.6</td>
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<td>X</td>
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<td>X</td>
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<td>-147.3</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

- PVC Coupler

### Comment

**Shaft Tip Elevation:** -151.5 ft

**Top of Inspection Tube Elevation:** -15 ft

**Top of Concrete Elevation:** -147.8 ft

**Supervisor:** Jerry Flores

**Date:** 6/7/15

**Inspection:**

**Date:**

**Issue:** 1

**Rev.:** 0

**September 2011**

**Mod. No. 8-07**
APPENDIX G–SLURRY DISPLACEMENT PILES

APPENDIX C

Gamma-Gamma Logging Acceptance Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
GAMMA-GAMMA LOGGING ACCEPTANCE TEST RESULTS

SR4 Crosstown Viaduct

Pile 7-1 at Bent 7

EA 10-051104
Bridge No. 29-0350
10-SJ-4-T14.83
Date Tested: 4/23/15

108" Diameter C/DH Pile
Reported Cut-off Elev. = -15.00 ft
Reported Pile Tip Elev. = -151.5 ft
Winch/Probe/Source: 1328-3581-429

The mean and standard deviation were calculated using density readings from all pipes, excluding portions significantly impacted by reinforcement and anomalies, as applicable.
APPENDIX D

Cross-Hole Sonic Logging Test Results

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
Foundation Testing Branch

Legend:
- Dashed line: Anomalies Detected/Inconclusive by Crosshole Sonic Logging
- Solid line: No Anomalies Detected by Crosshole Sonic Logging (CSL)
- White square: Anomalies Detected by Gamma-Gamma Logging (GGL)
- Black dot: No Anomalies Detected by GGL
- White circle: Inspection Pipe(s) Not Tested by GGL
- White octagon: Inspection Pipe(s) Not Tested by GGL and CSL

Crosshole Sonic Logging Test Results
SR4 Crosstown Viaduct – Pile 1 at Bent 7: Section (A-A)
Approximate Depth Range: 51.4 feet to 52.3 feet

Bridge Number: 29-0350
10-SJ-4-T14.83
Dated Tested: 4/30/2015

EA. 10-0S1104
9 ft. Diam. CIDH Pile
Reported Top of Conc. Elev.: -15.00 ft
Reported Tip Elev.: -151.50 ft
California D.O.T.
Br. 29-0350 Bent 7 Pile 1 (West)

<table>
<thead>
<tr>
<th>Tube Number</th>
<th>L</th>
<th>Spacing</th>
<th>Gain</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6</td>
<td>164.25, 164.29 ft</td>
<td>28.8 in</td>
<td>255</td>
<td>4/28/2015 12:13</td>
</tr>
<tr>
<td>6-7</td>
<td>164.15, 164.20 ft</td>
<td>28.8 in</td>
<td>255</td>
<td>4/28/2015 12:18</td>
</tr>
</tbody>
</table>

[Graphs and data related to pile testing]
<table>
<thead>
<tr>
<th>Pile</th>
<th>Profile</th>
<th>Start (feet)</th>
<th>To (feet)</th>
<th>Peak (feet)</th>
<th>Energy Decrease</th>
<th>FAT Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-0350-B7-01</td>
<td>5-7</td>
<td>132.93</td>
<td>132.93</td>
<td>132.93</td>
<td>11.4dB</td>
<td></td>
</tr>
<tr>
<td>File</td>
<td>Pref</td>
<td>Distance</td>
<td>Avg AT</td>
<td>Avg WS</td>
<td>Standard Discrete</td>
<td>Max PSD</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>29-0350-B7-P1</td>
<td>5-6</td>
<td>28.8</td>
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<td>134</td>
<td>0.031</td>
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<td>6-7</td>
<td>28.8</td>
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<td>5-7</td>
<td>55.3</td>
<td>0.311</td>
<td>14811</td>
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<td>0.021</td>
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</table>
APPENDIX E

Cross-Hole Sonic Logging Rating Criteria

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
# CROSSHOLE SONIC LOGGING RATING CRITERIA

<table>
<thead>
<tr>
<th>RATING</th>
<th>INCREASE IN ARRIVAL TIME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEPTABLE</td>
<td>0 – 10%</td>
<td>No signal distortion and an increase in signal arrival time of 10% or less are indicative of acceptable quality concrete.</td>
</tr>
<tr>
<td>MINOR ANOMALIES</td>
<td>10 – 20%</td>
<td>Minor signal distortion and lower signal amplitude with an increase in signal arrival time between 10% and 20% are indicative of minor contamination or intrusion and/or questionable quality concrete.</td>
</tr>
<tr>
<td>SIGNIFICANT ANOMALIES</td>
<td>More than 20%</td>
<td>Severe signal distortion and much lower signal amplitude with an increase in signal arrival time of 20% or more are indicative of water slurry contamination or soil intrusion and/or poor quality concrete.</td>
</tr>
<tr>
<td>NO SIGNAL</td>
<td></td>
<td>No signal was received. It is highly probable that a soil intrusion or other severe defect has absorbed the signal. It may also be due to debonding between the inspection tubes and concrete, especially in the portions of the piles above the water table.</td>
</tr>
<tr>
<td>WATER</td>
<td></td>
<td>A measured signal velocity of nominally V = 4,800 to 5,000 ft/sec is indicative of a water intrusion or a water-filled gravel intrusion with few or no fines present.</td>
</tr>
</tbody>
</table>
APPENDIX F

Revised Pile Design Data Forms (PDDF’s)

SR4 Crosstown Viaduct
Bridge No. 29-0350

Pile 1 at Bent 7
## Appendix D - Pile Design Data Form (GGL)

### 1 Foundation Testing

<table>
<thead>
<tr>
<th>Anomaly Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft Diameter: 108&quot; CIDH</td>
</tr>
<tr>
<td>Cutoff Elev. Or Top of Concrete Elev: -15.00'</td>
</tr>
<tr>
<td>Permanent Steel Casing</td>
</tr>
</tbody>
</table>

**Section A - A**
- Elev: -66.4 to -67.3'
- Depth: 51.4' to 52.3'

**Section B - B**
- Elev: Depth:

### 2 Geotechnical

<table>
<thead>
<tr>
<th>Required Nominal Resistance of Pile (per contract plans):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression: kips Tension: kips</td>
</tr>
<tr>
<td>Groundwater Elevation:</td>
</tr>
</tbody>
</table>

"As-Designed" nominal resistance over entire pile surface from the top to bottom elev. of anomaly / capacity loss within anomaly length (kips): Section A-A: Compression □ Tension □

Soil and/or Rock Type: □ Acceptable □ Unacceptable

Section B-B: Compression □ Tension □

Soil and/or Rock Type: □ Acceptable □ Unacceptable

**Comments:**

### 3 Structural

**As-Designed Capacity of Shaft**

- **Section A-A:**
  - Shear: 
  - Moment: 

- **Section B-B:**
  - Shear: 
  - Moment: 

**Maximum Demand of Shaft at Section A-A:**

- Shear: 
- Moment: 
- Shaft is structurally: □ Acceptable □ Unacceptable

**Maximum Demand of Shaft at Section B-B:**

- Shear: 
- Moment: 
- Shaft is structurally: □ Acceptable □ Unacceptable

### 4 Corrosion

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Required</th>
<th>Not Required</th>
</tr>
</thead>
</table>

For anomalies between the top of pile and 3 feet below the groundwater level at the site, corrosion results listed in the Geotechnical report are used to assess the need for repair. For situations where results are not available, soil samples may be obtained adjacent to the anomaly and tested in accordance with California Test (CT) 643 (Parts 2, 3 and 4) and if necessary, CT 417 and CT 422 to determine soil corrosivity. For anomalies outside these limits, and where no stray current source can be identified, or for non-corrosive soil conditions, no consideration of corrosion potential is required.

**Corrosion Potential at Section A-A:**

**Corrosion Potential at Section B-B:**

### 5 Construction

<table>
<thead>
<tr>
<th>Structure Rep.:</th>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec. A-A is: □ Acceptable with Administrative Deduction □ Unacceptable: Mitigation is Required</td>
<td></td>
</tr>
<tr>
<td>Sec. B-B is: □ Acceptable with Administrative Deduction □ Unacceptable: Mitigation is Required</td>
<td></td>
</tr>
</tbody>
</table>

**Bridge:** SR4 Crossover Viaduct
**Bridge No.:** 28-0050
**Bent:** 7

**Dist-Co-Rte:** 10-SJ-4-T14.83
**EA:** 10-081104
**Pile:** 7-1

**Structure Rep.:** Allen King
**Phone:** (209) 470-6619
**Fax:** n/a